Fixing device

DESCRIPTION

The invention relates to a fixing device for a cover of a drainage channel, road or yard gully or similar surface drainage devices, said cover being placed on an upper rim of a channel body, runoff box or similar structure that can be embedded in the ground, according to the precharacterizing clause of Claim 1.

For industrial purposes as well as in the public or private sectors surface drainage devices are employed to carry away rain or muddy water, water that has been used for cleaning, or environmentally hazardous liquids. When used to drain roadways, parking lots or pedestrian zones, for example, such devices must be able to withstand high static and dynamic loads. A crucial factor here is that the cover be seated and fixed on the body that can be embedded in the ground, so as to ensure in particular the stability of the surface drainage device, especially its cover, when exposed to traffic.

The general set of problems encountered with fixing devices for this purpose resides primarily, for instance in the presence of dynamic loads caused when vehicles drive over the cover at high speed, on one hand in the fact that the cover must be kept in its position on the body embedded in the ground while at the same time uncoordinated evasive movements of the cover, resulting in danger to traffic or undesirable noise, ought to be avoided. On the other hand the cover should be held in place

in such a way that it can easily be removed and inserted again, so that any necessary maintenance and cleaning work can be performed rapidly and simply. It must also be ensured that the high pressure that pushes the cover against the underlying structure does not cause fatigue of the material in the surface drainage device.

The document DE 195 45 131 A1 discloses fixing devices for a cover such that at each device a fastener bolt at the cover engages a fastener element associated with the channel body. After it has been locked in position, the cover lies on an upper rim of the channel body. The locking and removal of the cover in this case is extremely laborious, because each fastener bolt must be individually screwed to the channel body or released therefrom. In addition, in particular impulse-like loads applied to the cover are absorbed exclusively by the cover and channel body, which at least in certain regions of the surface drainage device can easily cause material fatigue.

From DE 202 00 509 a device for locking a covering grate to drainage channels in known, in which the cover rests on an upper rim of the channel body when locked in position. The fixing device disclosed there permits rapid locking of the cover to the channel body, but requires an extremely complex arrangement. Here again, as mentioned above, impulse-like loads applied to the cover must be absorbed exclusively by the cover and channel body. Hence the surface drainage device undergoes excessive stress, so that material fatigue results.

It is the objective of the invention that a fixing device for a cover placed on an upper rim of a channel body, runoff box or similar structure that can be embedded in the ground, as part of a drainage channel, road or yard gully or similar surface drainage devices, is developed further in such a way that a secure locking of the cover is obtained by simple manipulation, while at the same time the cover is optimally seated.

This objective is achieved by a fixing device according to Claim 1.

In particular, the problem concerned here is solved by a fixing device for a cover placed on an upper rim of a channel body, runoff box or similar structure that can be embedded in the ground, as part of a drainage channel, road or yard gully or similar surface drainage devices, that comprises first fixing elements at the cover and second fixing elements at the body embeddable in the ground, such that the first and second fixing elements can be snapped together in order to hold the cover to the body, the first fixing elements and/or the second fixing elements each comprising at least one damping section with a contact surface between the cover and the body embeddable in the ground, so that when locked in position the cover is spaced apart from the upper rim of the body.

A substantial point of the invention resides in the fact that the fixing elements serve simultaneously as damping elements between the cover and the body embeddable in the ground, the damping elements being disposed at the upper rim of the body embeddable in the ground and/or at the cover in order to avoid direct contact between the upper rim and the cover. Kinetic energy introduced into the surface drainage device by a dynamic load is converted by the drainage device into potential energy and, when the movement direction is reversed, is released again as kinetic energy. A damping material installed in the surface drainage device absorbs additional energy, so that the amount of energy released by the device is considerably less than the amount introduced. As a result, impulse-like impacts and resulting uncoordinated movements of the cover are alleviated, because the movement velocity of the cover is reduced as intended. Furthermore, clattering noises are damped. And in addition, both owing to the damping material and also because evasive movements of the cover are possible, when the cover is pressed strongly against the upper rim of the body this

pressure is compensated, so that material fatigue in the surface drainage device is prevented.

Preferred further developments of the invention are given in the subordinate claims.

For instance, in one preferred embodiment the damping section is constructed so as to be elevated with respect to the level of the upper rim of the body, at each of the second fixing elements that serve to lock the cover by way of its first fixing elements, such that the elevation extends in a direction perpendicular to the long direction of the upper rim. The advantage here is the simple construction and hence an economical manufacture of the fixing elements integrated into the body. The fixing elements are merely set at a particular height by lengthening them in a direction perpendicular to the long direction of the upper rim, and thus in the simplest possible manner serve the purpose of optimizing the seating of the cover while simultaneously facilitating its locking.

In another preferred embodiment the damping section is constructed as an integral component of the first fixing element, which protrudes beyond the level of the surface of the cover that faces a body embeddable in the ground. In this case the first element divides the protrusion, so that ultimately two protrusions are formed at the first element. Then the protrusions extend in the long direction of the body embeddable in the ground, such that they are apposed at least to the second fixing element. The protrusion associated with the first fixing element can advantageously be lengthened as desired in the long direction of the body, so that it extends beyond the second fixing element to contact the upper rim or frame of the body. This is advantageous when a high damping action is to be obtained in case of heavy loading of the surface drainage device.

Alternatively it is possible to attach the damping sections to both the first and the second fixing element. The advantage here is that in addition to their damping action they cooperate with one another, so that they are exposed to less wear and tear.

The protrusion can preferably be elevated 1 to 2 mm above the upper rim of the body and/or above the surface of the cover that faces the body. As a result, the seating of the cover is optimized with the smallest possible consumption of material and hence with low manufacturing costs.

The first and/or the second fixing elements are in each case made of elastic material, such as spring steel or an elastomer. Thus in the simplest manner impacts and oscillations are absorbed, and disturbing clatter noises caused when vehicles drive over the cover are damped.

In another advantageous embodiment the first and second fixing elements are each disposed in the body embeddable in the ground or on the cover so that they cannot be lost, i.e. are captive. For example, the second fixing elements are cast into the body or glued thereto. This ensures an extremely economical means of attaching the elements.

However, it is also possible to install in particular the second fixing element in the body in such a way that although captive, it can nevertheless be exchanged, e.g. in case it becomes worn. Preferably for this purpose both the prefabricated channel body and also the frame comprise apertures that are accessible from an interior of the channel and into which the fixing element can be inserted. To guarantee secure retention of the fixing element, primarily during removal of the cover, the element can advantageously be constructed with projections that extend outward from the side of the element and hence in the long direction of the channel body, being situated opposite one another and pointing in

opposite directions. These projections are preferably disposed such that they are distinctly spaced apart from the upper rim when the fixing element has been inserted. If in particular the aperture in the channel body corresponds substantially to the shape of the fixing element, then the projections are covered by the overlying channel material in such a way that during removal of the cover, with the associated vertical pulling forces, the element cannot be dragged along and remains in the body. A captive installation of the fixing element also ensures secure locking of the cover to the body, because in addition to the vertical pulling forces, horizontal displacing forces can be absorbed by the fixing elements engaged with one another. Furthermore, the elements cannot be lost during installation or repair and maintenance work on the surface drainage device.

Preferably the first and second fixing elements are designed to be complementary to one another. To this end, for example, the second fixing elements have the shape of a parallelepiped and accordingly each has two side walls opposite one another, a front wall, a back wall opposite the front wall, an upper wall and a lower wall opposite the upper wall. The front wall of the second fixing element extends parallel to the long direction of the body embeddable in the ground and faces toward the middle of the channel body. The side walls are thus perpendicular to the long direction of the body embeddable in the ground. To receive the first fixing element each of the fixing-element parallelepipeds incorporates a cavity that is accessible from at least one of its sides. By way of an opening on the upper wall of the second fixing element, the first fixing element comes into engagement with the cavity. For this purpose the first fixing element is, for example, shaped like a peg. Ideally the first and the second fixing elements then engage one another in such a way that the first fixing elements are protected while housed within the second fixing elements.

The solution in accordance with the invention provides that the first peg-shaped fixing elements and the second fixing

elements, which enclose a cavity, each comprise at least one lug-like projection. The first fixing elements in each case can then be brought into engagement by way of these projections, in particular can be snapped together, because the first and/or the second elements in each case are made of flexible material. Preferably the first and the second fixing elements are made of materials differing in hardness. The at least one lug-like projection of the first fixing element must overcome the at least one lug-like projection of the second fixing element, so that the first fixing element is subsequently held in the cavity within the second element. As a result of the fact that the at least one projection of the second fixing element then overlies the at least one projection of the first fixing element, the first fixing element and hence the cover is held in its locked position. This requires that the at least one lug-like projection of at least one fixing element, or the entire fixing element, be flexibly deformable and hence be made of an elastic material, for example spring steel or an elastomer. The hardness of the material, however, must be specified such that the vertical forces acting to pull the cover out are counteracted by the higher stiffness of one fixing element in comparison to the additional fixing element engaged therewith.

An especially simple and economical embodiment for the second fixing elements can be obtained by projections in the shape of rods. The rods projecting into the cavity of the fixing device are preferably made rigid and can be brought into snapping engagement with first fixing elements that are flexible and that, for example, each comprise recesses to receive the rods when the cover is locked in place.

In one advantageous embodiment a first lug-like projection is disposed within the second fixing element in each case, to form a clamp together with a second lug-like projection disposed opposite thereto. This design enables a particularly secure and nevertheless simple locking of the cover by way of the latter's

first fixing element, because the clamp to a great extent encloses the engaged fixing element.

Alternatively there is provided within one fixing element only a single lug-like projection to engage the complementary fixing element and, for example, in another body wall opposite this wall of the body a fixing element is formed with a lug-like projection oriented in the opposite direction. Hence a locking mechanism would be embodied that saves material, is economical and is adequately secure in particular for a surface drainage device designed for relatively slight imposition of force. This embodiment is particularly simple and economical to manufacture.

Advantageously the at least one lug-like projection within the associated fixing element extends parallel to the long direction of the body embeddable in the ground, i.e. along the back wall of the fixing element. Hence an entire length of the associated fixing elements in the long direction of the body embeddable in the ground can be used to form the lug-like projection, and/or the fixing elements can be made arbitrarily long so that in particular high forces acting on the surface drainage device can be absorbed while keeping the cover locked.

Alternatively the at least one lug-like projection extends perpendicular to the long direction of the body embeddable in the ground, i.e. along one of the side walls of the fixing element. This likewise enables a secure, space-saving and simple locking of the cover onto the body embeddable in the ground.

In another preferred embodiment the first fixing elements are made flat in each case. This enables simple manufacture of the fixing elements and ensures an optimal snapping engagement in the complementary fixing elements.

Furthermore, as one of the preferred embodiments it is provided that the damping section is constructed as an integral component of the first fixing element, a height of the first fixing element perpendicular to the long direction of the body embeddable in the ground being dimensioned such that the first fixing element is in contact with a floor of the cavity in the second fixing element, and a space separating the locked cover from the upper rim of the body embeddable in the ground can be produced. Advantageously, this construction is easy to implement, and a fixing element with the desired height can be manufactured simply and economically.

It is advantagous for the second fixing elements each to be situated in opposite side walls of the body, preferably directly opposite one another. This ensures easy locking of the cover, and the fixing elements are accommodated in a space-saving manner, so that a free channel cross section is available. In addition, the fixing elements are hardly accessible to external influences, which is especially important when the cover is not locked in position, because they are protected within the side walls of the body.

Alternatively it is possible for the second fixing elements to be disposed in opposite side walls of the body but offset from one another. A clatter-free retention of the cover on the body embedded in the ground is ensured in particular by this offset arrangement of the fixing elements.

For another device in a preferred embodiment it is provided that the second fixing elements each comprise at least one opening towards a middle of the body, so that if dirt should enter the fixing elements it can be ejected, in particular when the first fixing elements are being inserted into the body. This ensures that no contaminants can become stuck within the fixing elements and thus make locking of the cover difficult. The work of cleaning is thereby facilitated, because any dirt

that is present can be rinsed out directly and washed to the middle of the body.

In the following, exemplary embodiments of the invention are described in greater detail with reference to drawings, wherein

Fig. 1 is a schematic drawing in perspective of a second fixing element installed in a channel body and a corresponding first fixing element, in a first embodiment;

Fig. 2 shows a schematic front view of the first and the second fixing elements in Fig. 1, wherein the first fixing element has been set onto the second fixing element;

Fig. 3 shows a schematic front view of the first and the second fixing elements in Fig. 1, wherein the elements are engaged with one another;

Fig. 4 is a schematic drawing in perspective of a second fixing element installed in a channel body and a corresponding first fixing element, in a second embodiment;

Fig. 5 is a schematic drawing in perspective of a second fixing element installed in a channel body, in a third embodiment;

Fig. 6 shows a schematic front view of a first and a second fixing element in a fourth embodiment;

Fig. 7 shows a schematic front view of a first and a second fixing element in a fifth embodiment and

Fig. 8 is a schematic drawing in perspective of a second fixing element installed in a channel body and a

corresponding first fixing element, in a sixth embodiment.

In the following description, the same reference numerals are used for identical parts or parts with identical actions.

The perspective drawings in Fig. 1 show a second fixing element 20a and a first fixing element 10a, which corresponds to the second element 20a and can be received therein; said first fixing element is disposed on a cover 7 that can be set onto an upper rim 6 of a body 2 embeddable in the ground. The fixing element 20a is fastened within a wall 3 of a channel body 2. It is advantageous that the element 20a is thereby protected and disposed in a space-saving manner, so that a free channel cross section is available for the materials that are to be guided away in the surface drainage device.

The second fixing element 20a has the overall shape of a parallelepiped and accordingly comprises two side walls 30, 30' disposed opposite one another, a front wall 28, a back wall 29 opposite the front wall 28, an upper wall 31 and a lower wall opposite the upper wall 31. The front wall 28 extends parallel to the long direction of the body 2 embeddable in the ground and faces toward a middle of the channel body 2. The side walls 30, 30' extend in a direction transverse to the long direction of the body 2 embeddable in the ground. The side walls 30, 30', the front wall 28 and back wall 29, the upper wall 31 and the lower wall define a cavity 23. By way of a first opening 25 in the upper wall 31 of the second fixing element 20a, the first fixing element 10a can be set into the cavity 23.

The second fixing element 20a is preferably cast into the channel body 2. Accordingly, an edge-protecting frame 5 that covers the upper rim 6 comprises openings to make the element 20a accessible. The fixing element 20a is disposed within the channel body 2 in such a way that it protrudes above the upper rim 6, preferably by ca. 2 mm. Hence the fixing element 20a

comprises a protrusion 27, 27' above the level of the upper rim 6. Consequently a cover 7 set onto it does not lie directly on the upper rim 6 of the channel body 2, or on the frame 5, but rather on a bearing surface that extends parallel to the upper rim 6 and is formed by the protrusion 27, 27', which serves as contact surface 11, 11' between the cover 7 and the body 2 embeddable in the ground, and is therefore spaced apart from the upper rim 6. The second fixing element 20a is preferably made of an elastic material, for example spring steel or an elastomer, so that the protrusion 27, 27' acts as a damping section 26, 26' and the cover 7 is seated so as to be damped. Hence impacts applied to the surface drainage device from outside are attenuated and disturbing clattering noises of the cover 7 are avoided.

The second fixing element 20a comprises two lug-like projections 22, 22' situated opposite and spaced apart from one another, which within the cavity 23 extend perpendicular to the long direction of the body 2 embeddable in the ground, i.e. they run along the side walls 30, 30' of the second fixing element. The projections 22, 22' in this exemplary embodiment are in part an integral component of the protrusion 27, 27' and extend perpendicular to the long direction of the body 2 embeddable in the ground, i.e. they are situated on the side walls 30, 30' of the fixing element 20a.

A second opening 24 is formed in the front wall 28 of the second fixing element 20a, in such a way that the cavity 23 is open toward the middle of the channel body 2. Accordingly, any dirt or the like that is present in the fixing element 20a can be shifted directly into the channel body 2.

The first opening 25 and the second opening 24 of the fixing element 20a in this embodiment are joined to one another. The back wall 29 of the fixing element 20a comprises a third opening 24' that is joined to the first opening 25 and second opening 24, so that the fixing element 20a has substantially a

U-shaped configuration, forming a clamp within which to receive the first fixing element 10a. Accordingly, the protrusion 27, 27' comprises two contact surfaces 21, 21' that are separated from one another. The lug-like projections 22, 22' are adjacent to the contact surfaces 21, 21' in the direction toward the cavity 23, and each of them is tapered toward the cavity 23 to ensure that the first fixing element 10a will click into place, on account of the greater flexibility of the tapered projections 22, 22' in comparison to the remaining region of the second fixing element 20a.

Because of the relatively simple configuration of the U-shaped fixing element 20a, locking of the cover 7 can be implemented economically while the associated manipulation is simple and efficient.

Because a width B_{20a} of the fixing element 20a transverse to the long direction of the channel body 2 in this case corresponds substantially to a width B_4 of the upper rim 6 of the body 2, in the direction transverse to its long direction, the third opening 24' of the fixing element 20a in this exemplary embodiment is closed by the frame 5, which has been cast into the body 2 and passes over an outer surface of the wall 3 of the body 2. The fixing element 20a is thus advantageously protected at its back from the entrance of soil. The front wall 28 of the fixing element 20a is flush with an inner surface of the wall 3 of the channel body 2. Accordingly, this wall of the channel 2 together with the fixing element 20a forms a planar surface next to a channel interior, so that no dirt can adhere to it.

Alternatively, the width B_{20a} of the fixing element 20a transverse to the long direction of the channel body 2 can be smaller than the width B_4 of the upper rim 6 of the body 2 transverse to its long direction. The fixing element 20a would then be surrounded by the channel material at its back wall 29, so that the frame 5 can be eliminated in this region. It would

in addition be possible to surround the fixing element 20a with channel material at its front wall as well. The element 20a would then be enclosed in the channel wall 3 and completely protected. It would then be advantageous for the channel wall 3 to comprise an opening, to enable any pollutants to be rinsed out of the fixing element 20a.

The first fixing element 10a on the cover 7 is constructed so as to correspond to this embodiment of the second fixing element 20a. The fixing element 10a is shaped like a broad, flat peg and likewise comprises lug-like projections 12, 12', so that it can be inserted into the cavity 23 within the second fixing element 20a.

Because the width B_{20a} of the fixing element 20a and a width B_{22} of the projections 22, 22' correspond substantially to the width B_4 of the upper rim 6, a width B_{10a} of the first fixing element 10a likewise corresponds substantially to the width B_4 of the upper rim 6.

Figure 2 shows a schematic front view of the first fixing element 10a as it acts on the second fixing element 20a. At this stage the first fixing element 10a is seated on the second fixing element 20a without being engaged with the element 20a. When a force F applied in the direction indicated by the arrow is transferred from the two lug-like projections 12, 12' of the first fixing element 10a to the lug-like projections 22, 22' of the second fixing element 20a, i.e. toward a floor of the cavity 23, the projections 22, 22' become elastically deformed, so that they are overcome by the projections 12, 12'. The projections 22, 22' are accordingly made of elastic material, for example spring steel or an elastomer. As a result it is possible for the first fixing element 10a to be enclosed completely within the cavity 23 of the second fixing element 20a, so that the cover is locked in place by means of the fixing elements 10a, 20a (see Fig. 3).

If the first fixing element 10a is formed rigidly on a cast cover, for example, it is preferably cast along with the cover during the manufacturing process. Alternatively, it is possible to make the first fixing element 10a elastic as well. The element 10a is then attached to the cover 7 in a subsequent process. However, the hardness of the material should be specified such that the vertical pulling forces acting on the cover 7 are counteracted because of the greater stiffness of a fixing element in comparison with the other fixing element with which it is engaged.

Figure 3 shows a schematic front view of the complementary fixing elements 10a, 20a when they are engaged with one another. Because the projections 12, 12' of the first fixing element 10a in the locked position are covered by the projections 22, 22' of the second fixing element 20a, the first fixing element 10a and hence the cover 7 are retained in their locked position.

Figure 4 shows a first fixing element 10b and a second fixing element 20b, each in an embodiment different from but similar to the previous one. The fixing element 20b differs from the fixing element 20a in that the openings 24, 25 are separated from one another, so that the contact surface 21 formed by the protrusion 27 is designed as a continuous region.

This arrangement enlarges the contact surface 21 and enables a first fixing element 10b that may be caught in the second fixing element 20b to be securely retained and guided therein. This is advantageous in particular when the surface drainage device is exposed to extremely high loads. So that any pollution that may be present can nevertheless be washed away into the channel body 2, the opening 24 is provided for that purpose in a front wall 28 of the fixing element 20b, which is oriented toward the middle of the channel.

The fixing element 10b disposed on the cover 7 corresponds substantially to the element 10a in Fig. 1. However, the element 10b has a width B_{10b} that is less than the width B_{10a} of the element 10a. That is, construction of the contact surface 21 as a continuous region requires that the projections be shortened, so that the fixing element 10b is adapted thereto.

The embodiment according to Fig. 5 has a second fixing element 20c similar to those previously described. The projection 22 provided for locking, however, in this case runs parallel to the long direction of the body 2 embeddable in the ground; that is, it is attached to the back wall 29 of the fixing element 20c. This has the particular advantage that an entire length L of the cavity 23 in the long direction of the body 2 can be used to form the lug-like projection 22, and/or the fixing elements 20c can be made arbitrarily long so that in particular high forces acting on the surface drainage device can be absorbed while keeping the cover 7 locked in place.

Figures 1 to 4 show fixing elements 20a, 20b that each have two projections 22, 22' disposed opposite one another. Alternatively, it would be possible to dispose only one projection 22 within each second fixing element (cf. Fig. 5) and, for example, provide an oppositely oriented projection 22 as part of the second fixing element disposed in another wall of the channel body 2 situated opposite the channel wall 3. This would implement a material-saving, economical locking mechanism that is in particular adequately secure for a surface drainage device designed to withstand relatively low forces. If the first fixing element nevertheless comprises two projections, one of these projections will extend into empty space, but the grate can be set onto the channel independently of the first fixing elements. To save material in construction of the first fixing elements, these are likewise made with only one projection, which comes into engagement with the associated projection of the second fixing element in each case.

The apparatus shown in Fig. 5 ultimately enables only one projection 22 to be formed in each fixing element 20c and requires the presence of a complementary bearing in the channel wall of the body 2 that is opposite the channel wall 3. If a front wall 28 is explicitly formed in the parallelepiped constituting the fixing element 20c, as in the embodiment according to Fig. 4, i.e. if the entrance opening 25 for the complementary fixing element 10c and the opening 24 for emergence of contaminants from the fixing element 20c were separate from one another, it would be possible to provide a second projection 22 here as well. The projections 22, 22' could then be made long and narrow and hence be able to support high forces.

A possible first fixing element (not shown here) that corresponds to the second fixing element 20c, in the case of the projection/projections 22, 22' fixed to the back wall 29 and/or to the front wall 28, would have to be fixed to the corresponding cover 7 so as to be rotated by 90° in comparison to the fixing elements 10a, 10b.

Figure 6 is a front view of fixing elements 10d, 20d that are engaged with one another. The second fixing element 20d is substantially similar to that shown in Figs. 1 to 3, but in this embodiment it is flush with the frame 5 that covers the upper rim 6. So that the fixing element 20d can be accommodated in the wall 3 of the body 2, both the frame 5 and the channel body 2 comprise openings, so that the fixing element 20d can be inserted into the channel body 2 and when appropriate removed again. The opening in the channel body 2 in this exemplary embodiment is therefore constructed so as to substantially reproduce the shape of the fixing element 20d and, e.g., comprises grooves 4, 4'.

The element 20d comprises projections 32, 32' disposed opposite one another and extending out of the side walls 30, 30' in opposite directions along the long direction of the channel

body 2. Because the openings are accessible from the middle of the channel, the element 20d can preferably be pushed into them from that direction. Preferably the projections are disposed such that they are distinctly spaced apart from the upper rim when the fixing element has been inserted. Because in particular the opening in the channel body corresponds substantially to the shape of the fixing element, and the projections engage the grooves 4, 4', the projections are retained by the overlying channel material so that when the cover is removed, with the associated vertical pulling forces, the element is not pulled along with it but remains in the channel body.

Alternatively it is possible to cast the fixing elements together with the channel body, or to provide the prefabricated channel body with recesses within which the element is attached by adhesive. Each of these possibilities ensures a secure locking of the cover. Furthermore, the elements cannot be lost during installation of the surface drainage device or while it is undergoing repair or maintenance work.

The damping sections 16, 16' in this embodiment are constructed as protrusions 17, 17' above the level of a surface of the cover 7 that faces the body 2, and as an integral component of the first fixing element 10d. The protrusions 17, 17' each extend in the long direction of the body 2, on both sides of the flat first element 10d, so that the protrusions 17, 17' lie on the second fixing element 20d. It is advantageous for the protrusions 17, 17' at the first fixing element 10d to be made arbitrarily extensible in the long direction of the body 2, so that they can extend beyond the second fixing element 20d and lie on the upper rim 6 or frame 5 of the body 2. This is advantageous if it is desired to obtain a high damping action when the load imposed on the surface drainage device is high.

The fixing element 10d itself is made flat and comprises two lug-like projections 12, 12' and a central recess 14, i.e. it

is partially subdivided. If the element 10d is provided as a rigid element, for example has been cast along with the cover as a peg, material can be saved by providing this recess 14. However, if the element 10d is made flexible, the recess 14 can produce an increase in flexibility, so that the process of catching the element, in this case within the complementary second fixing element 20d, is simple and easily accomplished.

Figure 7 shows, likewise from the front, fixing elements 10e, 20e engaged with one another. The second fixing element 20e is basically similar to the one shown in Fig. 6. The element 20e in this embodiment is likewise inserted into the channel body 2 so that it is flush with the frame 5 that covers the upper rim 6. However, it consumes very little material and is simply designed. The lug-like projections 22, 22' are only partially attached to the associated side walls 30, 30' of the fixing element 20e, so that a lug extension is spaced apart from the associated side wall 30, 30'.

In this embodiment it is advantageous for both fixing elements 10e, 20e to be flexible, but the projections 22, 22' of the second fixing element 20e should be harder than the projections 12, 12' of the first fixing element 10e. Thus the first fixing element 10e is easily inserted, because the projections can be pushed toward the side walls 30, 30' with a springy action. Conversely, the locking is easily released owing to the elastic deformability of the projections 12, 12'.

The damping section 16 in this embodiment is an integral component of the first fixing element 10e and/or the second fixing element 20e. A height H of the first fixing element 10e perpendicular to the long direction of the body 2 is here dimensioned such that the first fixing element 10e bears against the floor of the cavity 23 of the second fixing element 20e, producing a space that separates the locked cover 7 from the upper rim 6 of the body 2 embeddable in the ground. Advantageously, this construction is easy to implement, and a

fixing element 10e with the desired height H can be simply and economically manufactured.

Figure 8 shows in perspective rod-like projections 22 that act as a second fixing element; these are rigid elements, ensuring an extremely simple and economical but nevertheless secure locking of the cover 7. The rods 22 in this embodiment are fitted into a frame section that is perpendicular to the part of the frame that covers the upper rim 6 of the body 2, and therefore extend outward from the frame 5 in the direction toward the middle of the channel. The rod-like projections are preferably made of V2A steel. A corresponding fixing element 10f in this embodiment is accordingly made in the shape of a hook, such that the rod-like projection is received between the sections forming the hook. It is useful for a recess 13 to be provided to receive the rod, so that the latter is securely seated when the cover 7 is locked in place.

In this exemplary embodiment the damping action is provided by the first fixing element 10f. For this purpose a damping section 16 extends over the height H of the element 10f, so that the first fixing element 10f lies on the frame 5 that covers the upper rim 6, and the locked cover 7 is spaced apart from the upper rim 6 of the body 2. Advantageously, this construction is easy to produce, and a fixing element 10f with the desired height H can be simply and economically manufactured.

In principle it is possible for damping sections 16, 16', 26, 26' to be disposed both at the first fixing element and at the second fixing element (not shown here). The advantage here is that in addition to the damping action the protrusions 17, 17', 27, 27' interact with one another, so that they are exposed to less wear and tear.

An extremely secure locking can be achieved when one fixing element is made of flexible material and the complementary

fixing element is of stiff construction. When the complementary fixing elements are both made flexible but with different hardness, it is easier to initiate the locking process and/or to release it again and hence is suitable – as mentioned above – for surface drainage devices that are exposed to relatively slight forces and for which frequent removal of the cover is to be expected.

At this juncture it should be pointed out that all of the parts described above, in particular the details presented in the drawings, are claimed as essential to the invention, individually or in any combination. Modifications thereof are familiar to a person skilled in the art.

List of reference numerals

1	Fixing device
2	Channel body
3	Wall of the channel body
4	Groove
4'	Groove
5	Frame
6	Upper rim
7	Cover
10a, 10b, 10d-10f	First fixing element
11	Contact surface
11'	Contact surface
12	Projection
12'	Projection
13	Recess
14	Recess
16	Damping section
16'	Damping section
17	Protrusion

17'	Protrusion
20a-20f	Second fixing element
21	Contact surface
21'	Contact surface
22	Projection
22'	Projection
23	Cavity
24	Opening
24'	Opening
25	Opening
26	Damping section
26'	Damping section
27	Protrusion
27'	Protrusion
28	Front wall
29	Back wall
30	Side wall
30'	Side wall
31	Upper wall
32	Projection
32'	Projection
B_4	Width of upper rim
B_{10a}, B_{10b}	Width of first fixing element
B_{20a}	Width of second fixing element
B_{22}	Width of projection
H	Height of first fixing element
L	Length of second fixing element